Appl. No.: 09/599,948
Amdt. dated 11/10/2005
Reply to Office action of 08/11/2005

REMARKS

This amendment is submitted in reply to the Office Action dated August 11, 2005. Claims 1-12 currently stand rejected. Applicant has added new claims 13 and 14 to further define patentable aspects of the invention. No new matter has been added by the amendment.

In light of the remarks presented below, Applicant respectfully requests reconsideration and allowance of all now-pending claims of the present application.

Double Patenting Rejections

Claims 6 and 12 stand rejected under the doctrine of obviousness-type double patenting as being unpatentable over claim 1 of Nash et al. (U.S. Patent No. 6,397,044, hereinafter "Nash"). Claims 1-5 and 7-11 stand rejected under the doctrine of obviousness-type double patenting as being unpatentable over claims 1-12 of Nash in view of Iwane (U.S. Patent No. 5,212,824).

Applicant has included herewith a terminal disclaimer in accordance with 37 CFR 1.321(c), and accordingly submits that the rejection of claims 1-12 under the doctrine of obviousness-type double patenting is overcome.

Claim Rejections - 35 USC §103

Claims 1-3 and 7-9 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Horie et al. (U.S. Patent No. 5,568,098, hereinafter "Horie") in view of Iwane. Claims 4, 5,10 and 11 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Horie in view of Iwane and further in view of Hickman, ("LTPs and active double balanced mixers", vol. 99, no. 1683, pg. 126-128, hereinafter "Hickman"). Claims 6 and 12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Horie in view of Iwane and further in view of Damgaard et al. (U.S. Patent No. 6,526,265, hereinafter "Damgaard"). Applicant respectfully traverses.

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I. The cited references fail to teach or suggest a means for rectifying a local oscillator signal.

Independent claim 1 recites, *inter alia*, a modulator including a first port for inputting a baseband signal, a second port for inputting a local oscillator signal, **means for rectifying the input local oscillator signal** to provide a conductance waveform at a multiple of the local oscillator.

Horie discloses a frequency synthesizer for use in a radio transmitter and receiver. As such, Horie discloses in Figures 4 and 5 conventional radio communication equipment which is similar to that described in the background section of the present application. The Office Action cites Figures 4 and 5 as teaching or suggesting "a modulator including a switching circuit, having a first port for inputting a baseband signal and a second port for inputting a local oscillator signal to the switching circuit which provide a conductance waveform at a frequency multiple of the local oscillator signal for up-converting the baseband signal to a radio modulated carrier (fig. 4-5, col. 3/ln. 1-col. 4/ln. 67)." Thus, Horie is not cited as teaching or suggesting a **means for rectifying the input local oscillator signal** as claimed in independent claim 1. Both Iwane and Hickman similarly fail to teach or suggest such feature and neither Iwane nor Hickman is cited as teaching such feature.

Accordingly, the Office Action fails to even allege that any reference teaches or suggests a means for rectifying the input local oscillator signal as claimed in independent claim 1. Furthermore, none of the cited references teach or suggest such a feature. In fact, Horie fails to disclose the details of the modulator, Hickman fails to disclose a modulator and Iwane fails to teach or suggest that the modulator includes a means to rectify. Accordingly, since Horie, Iwane and Hickman alone fail to teach or suggest a means for rectifying the local oscillator signal as claimed in independent claim 1, any combination of the cited references likewise fails to render independent claim 1 obvious for at least the same reasons described above. Claims 2-5 depend either directly or indirectly from independent claim 1, and thus include all the recitations of independent claim 1. Therefore, dependent claims 2-5 are patentable for at least those reasons given above for independent claim 1.

Accordingly, since Horie, Iwane and Hickman alone fail to teach or suggest a means for rectifying the local oscillator signal as claimed in independent claim 1, any combination of the cited references likewise fails to render independent claim 1 obvious for at least the same reasons described above. Claims 2-5 depend either directly or indirectly from independent claim 1, and thus include all the recitations of independent claim 1. Therefore, dependent claims 2-5 are patentable for at least those reasons given above for independent claim 1.

II. The cited references fail to teach or suggest a means for controlling gain of the oscillator.

Independent claims 1 and 7 recite, *inter alia*, a transmitter including **a means for controlling the gain of the modulator** thereby to control the output level of the modulator. In other words, the output level of the modulator is controllable by controlling the gain of the modulator. Such feature is directed to addressing the deficiencies of the prior art as discussed in the background section insofar as allowing a reduction in the number of components required to produce a transmitter.

As stated above, Horie fails to disclose the details of the modulator. Thus, Horie fails to teach or suggest a transmitter including **a means for controlling the gain of the modulator** thereby to control the output level of the modulator as claimed in independent claims 1 and 7. Furthermore, Horie is not cited as teaching such feature.

Accordingly, the Office Action cites Iwane as teaching such feature at Figure 2 and col. 2, line 66 to col. 4, line 56. Iwane is directed to an automatic power controller. Iwane discloses a quadrature modulator (15) which includes only an adder (15c) and two multipliers (15a) and (15b) (Figure 2 and col. 3, lines 43-44). A modulated RF signal (4) is output from the quadrature modulator (15) and fed into a variable attenuator (16). The output of the variable attenuator (16) is then fed into an RF power amplifier (5) to be amplified (Figure 2 and col. 3, lines 46-51).

Iwane fails to teach or suggest that the transmitter includes a means for controlling the **gain of the modulator** thereby to control the output level of the modulator as claimed in independent claims 1 and 7. In fact, no means to control the gain of the quadrature modulator (15) is disclosed. To the contrary, Iwane discloses a gain control element, the RF power

amplifier (5), which is a separate unit from that of the quadrature modulator (16) that is in fact separated from the modulator by an intervening element (i.e. the variable attenuator (16)). Iwane discloses that the variable attenuator (16) controls an output level of the quadrature modulator (15) (col. 3, lines 46-47). Thus, the output of the quadrature modulator (15) is controlled by means of attenuation and not by a means for controlling gain as claimed in independent claims 1 and 7. Iwane further discloses that the RF power amplifier (5) along with a feedback loop that excludes the quadrature modulator (15) are used to provide gain adjustment to control mean output power of the automatic power controller (col. 4, lines 43-52). Accordingly, Iwane discloses that the RF power amplifier (5) controls the gain of the controller (not the modulator) to control the output level of the controller (not the modulator). Thus, Iwane fails to teach or suggest that the transmitter includes a means for controlling the **gain of the modulator** thereby to control the output level of the modulator as claimed in independent claims 1 and 7. As stated above, Hickman fails to teach or suggest a modulator and therefore, fails to teach or suggest such a feature.

Accordingly, since Horie, Iwane and Hickman alone fail to teach or suggest a transmitter including **a means for controlling the gain of the modulator** thereby to control the output level of the modulator as claimed in independent claims 1 and 7, any combination of the cited references likewise fails to render independent claims 1 and 7 obvious for at least the same reasons described above. Claims 2-5 and 7-11 depend either directly or indirectly from independent claims 1 and 7, respectively, and thus include all the recitations of their respective independent claims. Therefore, dependent claims 2-5 and 7-11 are patentable for at least those reasons given above for independent claims 1 and 7.

Accordingly, Applicant respectfully submits that the rejections of claims 1-5 and 7-11 are overcome.

III. The cited references fail to teach or suggest a means for mixing for upconverting the baseband signal.

Independent claims 1 and 7 recite, *inter alia*, a means for mixing a baseband signal with a conductance waveform **for upconverting the baseband signal** to a radio frequency modulated

carrier. In other words, the baseband signal is mixed with a local oscillator frequency to produce a carrier frequency that is upconverted. Thus, in an exemplary embodiment, the baseband signal is mixed with a local oscillator frequency to produce a carrier frequency that is double that of the local oscillator.

Horie is directed to a frequency synthesizer and fails to disclose the details of a modulator. Horie discloses as prior art, quadrature modulators (12) and (18) in Figures 4 and 5, respectively. Figure 5 of Horie discloses a frequency multiplier (17) which produces a oscillation signal that is mixed with a baseband signal to produce a modulated radio signal (SM) (col. 1, lines 26-35), which is typical of prior art modulators as described in the background section of the present application. The quadrature modulator (18) of Horie multiplies an oscillation signal (SA) and then mixes the multiplied oscillation signal with the baseband signal to transmit a modulated carrier at a frequency of the multiplied oscillation signal. The modulated carrier frequency of Horie is the same frequency as the multiplied oscillation signal. In other words, the modulator mixes a pre-multiplied local oscillator signal, and accordingly the means for mixing does not upconvert the baseband signal as claimed in independent claims 1 and 7. Thus, Horie fails to teach or suggest a means for mixing a baseband signal with a conductance waveform **for upconverting the baseband signal** to a radio frequency modulated carrier as claimed in independent claims 1 and 7.

Both Iwane and Hickman fail to teach or suggest such feature and neither is cited as such. Accordingly, since Horie, Iwane and Hickman alone fail to teach or suggest a means for mixing a baseband signal with a conductance waveform **for upconverting the baseband signal** to a radio frequency modulated carrier as claimed in independent claims 1 and 7. any combination of the cited references likewise fails to render independent claims 1 and 7 obvious for at least the same reasons described above. Claims 2-5 and 7-11 depend either directly or indirectly from independent claims 1 and 7, respectively, and thus include all the recitations of their respective independent claims. Therefore, dependent claims 2-5 and 7-11 are patentable for at least those reasons given above for independent claims 1 and 7.

IV. The cited references fail to teach or suggest a sub-harmonic mixer as claimed.

Independent claims 6 and 12 recite, *inter alia*, a sub-harmonic mixer including a switching means for upconverting the baseband signal to transmission frequency at an even multiple of the local oscillator frequency. Thus, independent claims 6 and 12 are directed to a sub-harmonic mixer including recitations substantially similar to those of independent claims 1 and 7 with respect to upconverting the baseband signal.

As stated above, both Horie and Iwane fail to teach or suggest a sub-harmonic mixer including a switching means for upconverting the baseband signal to transmission frequency at an even multiple of the local oscillator frequency as claimed in independent claims 6 and 12. However, the Office Action further cites Damgaard as disclosing an even multiplication. Damgaard is directed to a downconverter (col. 11, lines 44-55) and thus, even if it were assumed that Damgaard disclosed even multiplication, Damgaard still fails to teach or suggest a sub-harmonic mixer including a switching means for upconverting the baseband signal to transmission frequency as claimed in independent claims 6 and 12.

Since Horie, Iwane and Damgaard alone fail to teach or suggest a sub-harmonic mixer including a switching means for upconverting the baseband signal to transmission frequency as claimed in independent claims 6 and 12, any combination of the cited references likewise fails to render independent claims 6 and 12 obvious for at least the same reasons described above.

Accordingly, for all the reasons stated above, Applicant respectfully submits that the rejections of claims 1-12 are overcome.

Newly Added Claims

Applicant has added new claims 13 and 14 to more particularly define aspects of the claimed invention. The new claims include no new matter and are fully supported by the specification and the drawings of the present application.

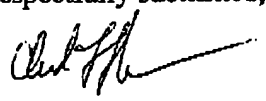
Accordingly, it is believed that the new claims are in condition for allowance.

CONCLUSION

In view of the amendment, the newly added claims and the remarks submitted above, it is respectfully submitted that the present claims are in condition for immediate allowance. It is therefore respectfully requested that a Notice of Allowance be issued. The Examiner is encouraged to contact Applicant's undersigned attorney to resolve any remaining issues in order to expedite examination of the present invention.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,



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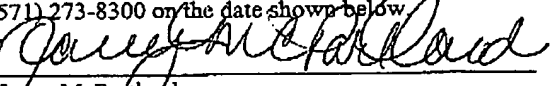

Nancy McPartland

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